During the 1980s the general consensus is that about 5% of nations children had autism. Some claimed that increases certain chemicals in the enviroment has led to an increase in autism.

(a) Write an appropriate hypothesis test for this situation

(b) Give an appropriate test for this hypoth stating what are necessary condition for performing test

(c) 384 - children, 46 - autism. perform a test of hypothesis & state P value

(d) what are your conclusion. & stat. how you use P value

⇒ solution -

a] Hypothesis statement

step 1 $H_0 = 0.05$

$H_a > 0.05$

Step 2 - 5% significant level

One tailed test

$\alpha = 0.05$

$Z_c = \pm 1.645$

Step 3 - To reject null hypothesis the observed value must be greater than $+1.645$ or less -1.645

Sample $\hat{p} = \frac{46}{384} = 0.119$

Step 4 - 'Z' value is calculated by

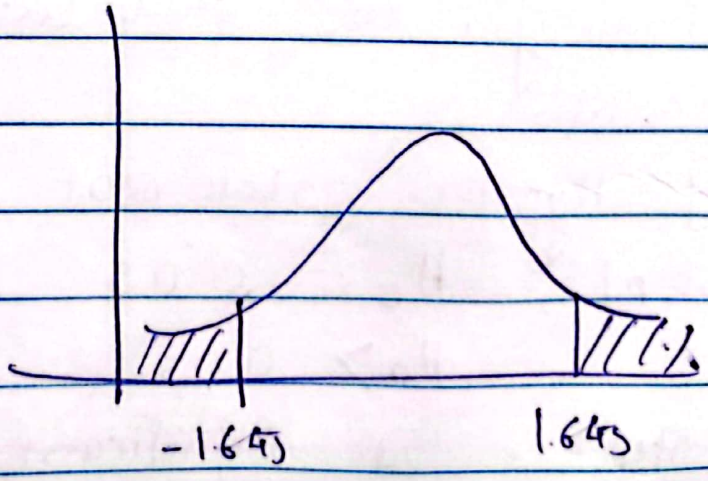
$$Z = \frac{\hat{p} - p}{\sqrt{\frac{p \cdot q}{n}}} = \frac{0.165 - 0.050}{\sqrt{\frac{0.05 * 0.95}{384}}}$$

$$= \frac{0.115}{\sqrt{\frac{0.0475}{384}}}$$

$$= \frac{0.115}{\sqrt{0.000123}}$$

$$= \frac{0.115}{0.011}$$

$$= 10.45$$



It is Observed Value of Z is in the rejection region (observed Z = 10.45 > Z = ± 1.645).

So reject the null hypothesis.

It is concluded that proportion of autism out of 384 children was not 0.05

$\alpha = 0.05$

$$Z = \frac{\hat{p}_c - p}{\frac{\sqrt{pq}}{n}}$$

$$\pm 1.645 = \frac{\hat{p}_c - 0.05}{\sqrt{\frac{(0.05)*(0.95)}{384}}}$$

$$\hat{p}_c = 0.05 \pm 1.695 \sqrt{\frac{(0.05)\cdot(0.95)}{384}}$$

$$= 0.05 \pm 1.695 \sqrt{\frac{0.0475}{384}}$$

$$= 0.05 \pm 1.695 \sqrt{0.000123}$$

$$= 0.05 \pm 1.695 (0.01109)$$

$$= 0.05 \pm 0.0187$$

0.068 and 0.0313

Since the sample proportions $\hat{p}$ is 0.165, which is greater than 0.068